



# MONTANA DEPARTMENT OF TRANSPORTATION INVITATION FOR BID (IFB) (THIS IS NOT AN ORDER)

IFB Number:  
HWY-309738-JA

IFB Title:  
MDS RADIO EQUIPMENT

IFB Due Date and Time:  
August 30, 2010  
3:00 p.m., Local Time

Number of Pages: 15

## ISSUING AGENCY INFORMATION

Procurement Officer:  
Jason Armstrong

Issue Date:  
August 13, 2010

MONTANA DEPARTMENT OF TRANSPORTATION  
PURCHASING SERVICES SECTION  
2701 PROSPECT AVE  
PO BOX 201001  
HELENA MT 59620-1001

Phone: (406) 444-6033  
Fax: (406) 444-5411  
TTY Users, (406) 444-7696

Website: <http://gsd.mt.gov/>

## INSTRUCTIONS TO BIDDERS

COMPLETE THE INFORMATION BELOW AND  
RETURN THIS PAGE WITH YOUR SEALED BID  
AND ANY REQUIRED DOCUMENTS TO:

#HWY-309738-JA  
PURCHASING SERVICES SECTION  
2701 PROSPECT AVE  
PO BOX 201001  
HELENA MT 59620-1001

Mark Face of Envelope/Package:

IFB Number: HWY-309738-JA  
IFB Due Date: August 30, 2010

**SEALED BIDS** will be received and publicly opened  
in the Administrative Division at 3:00 pm.

Attachments: NONE

## BIDDERS MUST COMPLETE THE FOLLOWING

Federal Tax ID Number:

Delivery Date:

Bidder Name/Address:

Authorized Bidder Signatory:

(Please print name and sign in ink)

Bidder Phone Number:

Bidder FAX Number:

Bidder E-mail Address:

HIGHWAY CIVIL RIGHTS

The Contractor must, in performance of work on this contract, fully comply with all applicable federal, state or local laws, rules and regulations. The Contractor must comply with the provisions of all appropriate federal laws, including Title VI of the Civil Rights Act of 1964. Any subletting or subcontracting by the Contractor subjects subcontractors to the same provisions of the appropriate federal laws, including Title VI of the Federal Civil Rights Act of 1964. In accordance with 49-3-207, MCA, the Contractor agrees that the hiring of persons to perform work on this contract will be made on the basis of merit and qualifications and that there will be no discrimination on the basis of race, color, religion, creed, political ideas, sex, age, marital status, physical or mental disabilities or national origin by the persons performing the contract.

BILL TO: DEPT OF TRANSPORTATION  
TRAFFIC & SAFETY BUREAU  
PO BOX 201001  
HELENA, MT 59620-1001

F.O.B. LOCATION: DEPT OF TRANSPORTATION  
TRAFFIC ENGINEERING  
2701 PROSPECT AVE.  
HELENA, MT 59620-1001

Questions may be directed to Phill Balsley at (406) 444-6218 in Helena. However, any changes to the requirements of the Invitation for Bid (IFB) can only be made by the Montana Department of Transportation (Department) in writing and claimed oral modifications are not valid or binding.

**1.0. STANDARD TERMS AND CONDITIONS**

By submitting a response to this invitation for bid, request for proposal or acceptance of a contract, the Contractor agrees to acceptance of the following Standard Terms and Conditions and any other provisions that are specific to this solicitation or contract.

**1.1. ACCEPTANCE/REJECTION OF BIDS OR PROPOSALS**

The Department reserves the right to accept or reject any or all bids or proposals, wholly or in part and to make awards in any manner deemed in the best interest of the Department. Bids and proposals will be firm for 30 days, unless stated otherwise in the text of the invitation for bid or request for proposal.

**1.2. ACCESS AND RETENTION OF RECORDS**

The Contractor agrees to provide the Department, Legislative Auditor or their authorized agents, access to any records necessary to determine contract compliance (Mont. Code Ann. § 18-1-118). The Contractor agrees to create and retain records supporting the services rendered or supplies delivered for a period of 3 years after either the completion date of the contract or the conclusion of any claim, litigation or exception relating to the contract taken by the State of Montana or third party.

**1.3. ALTERATION OF SOLICITATION DOCUMENT**

In the event of inconsistencies or contradictions between language contained in the Department's solicitation document and a Contractor's response, the language contained in the Department's original solicitation document will prevail. Intentional manipulation and/or alteration of solicitation document language will result in the Contractor's disqualification and possible debarment.

**1.4. ANTITRUST ASSIGNMENT CLAUSE**

All vendors, Contractors and subcontractors hereby assign to the State of Montana any and all claims or causes of action for any antitrust law violations or damages arising therefrom as to goods, materials and services purchased under the terms of this agreement and any change order that may result from this agreement. This assignment is made on behalf of the vendor, Contractor and all subcontractors, which may be hired or contracted with to furnish goods, materials or services.

## **1.5. ASSIGNMENT, TRANSFER AND SUBCONTRACTING**

The Contractor shall not assign, transfer or subcontract any portion of the contract without the express written consent of the Department. (Mont. Code Ann. § 18-4-141)

## **1.6. AUTHORITY**

The following bid, request for proposal, limited solicitation or contract is issued in accordance with Title 18, Montana Code Annotated and the Administrative Rules of Montana, Title 2, chapter 5.

## **1.7. BILLING**

The State of Montana cannot pay for materials or services in advance. All billing against this purchase order must be made only after completion of receipt of merchandise or services rendered.

## **1.8. COLLUSION PROHIBITED**

Prices quoted shall be established without collusion with other Contractors and without attempt to preclude the Department from obtaining the lowest possible competitive price.

## **1.9. COMPLIANCE WITH LAWS**

The Contractor must, in performance of work under the contract, fully comply with all applicable federal, state or local laws, rules and regulations, including the Montana Human Rights Act, the Civil Rights Act of 1964, the Age Discrimination Act of 1975, the Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973. Any subletting or subcontracting by the Contractor subjects subcontractors to the same provision. In accordance with section 49-3-207, MCA, the Contractor agrees that the hiring of persons to perform the contract will be made on the basis of merit and qualifications and there will be no discrimination based upon race, color, religion, creed, political ideas, sex, age, marital status, physical or mental disability or national origin by the persons performing the contract.

## **1.10. CONFORMANCE WITH CONTRACT**

No alteration of the terms, conditions, delivery, price, quality, quantities or specifications of the contract shall be granted without prior written consent of the Department's Purchasing Section. Supplies delivered which do not conform to the contract terms, conditions and specifications may be rejected and returned at the Contractor's expense.

## **1.11. DEBARMENT**

The Contractor certifies, by submitting this bid or proposal, that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participation in this transaction (contract) by any governmental department or agency. If the Contractor cannot certify this statement, attach a written explanation for review by the State.

## **1.12. DISABILITY ACCOMMODATIONS**

The State of Montana does not discriminate on the basis of disability in admission to, access to, or operations of its programs, services or activities. Individuals, who need aids, alternative document formats or services for effective communications or other disability-related accommodations in the programs and services offered are invited to make their needs and preferences known to this office. Interested parties should provide as much advance notice as possible.

### **1.13. EXCEPTIONS**

A prospective Contractor may take "exception" to bid terms, conditions, specifications and dates stated within the bid package. However, the Department reserves the right to disqualify any and all bids submitted which include exceptions, if deemed not in the Department's best interest.

### **1.14. FACSIMILE RESPONSES**

Facsimile bids sent directly to the Department of Transportation will not be accepted; however, facsimile bids sent to a 3rd party and then delivered to the Department in a properly addressed, sealed envelope will be accepted.

### **1.15. FAILURE TO HONOR BID/PROPOSAL**

If a bidder/Contractor to whom a contract is awarded refuses to accept the award (PO/contract) or, fails to deliver in accordance with the contract terms and conditions, the Department may, in its discretion, suspend the bidder/Contractor for a period of time from entering into any contracts with the State of Montana.

### **1.16. FORCE MAJEURE**

Neither party shall be responsible for failure to fulfill its obligations due to causes beyond its reasonable control, including without limitation, acts or omissions of government or military authority, acts of God, materials shortages, transportation delays, fires, floods, labor disturbances, riots, wars, terrorist acts or any other causes, directly or indirectly beyond the reasonable control of the non-performing party, so long as such party is using its best efforts to remedy such failure or delays.

### **1.17. HOLD HARMLESS/INDEMNIFICATION**

Contractor agrees to defend, protect, indemnify and save harmless the State of Montana and Department against and from all claims, liabilities, demands, causes of action, judgments (including costs and reasonable attorneys fees) and losses to them from any cause whatever (including patent, trademark and copyright infringements) from the Agreement and its execution. This includes any suits, claims, actions, losses, costs or damages of any kind, including the State's and Department's legal expenses, arising out of, in connection with, or incidental to the Agreement, but does not include any such suits, claims, actions, losses, costs or damages which are solely the result of the negligent acts, omissions or misconduct of Department's employees if they do not arise out of, depend upon or relate to a negligent act, omission or misconduct of Contractor's employees. The Contractor assumes all responsibility for ensuring and enforcing safe working conditions and compliance with all safety-related rules and regulations for the benefit of its own employees, the employees of any subcontractor and the public. That responsibility includes all duties relating to safety, regardless of whether any such duties are, or are alleged to be, "nondelegable" (e.g., the Montana Safe Place to Work Statute, etc.). This indemnification is expressly intended by the parties to include any claims, liabilities, demands, causes of action, judgments (including costs and reasonable attorneys fees) and losses that are, or are alleged or held to be, based upon a breach by the Department of a nondelegable duty relating to workplace safety for the Contractor's employees, the employees of any subcontractor and the public.

### **1.18. LATE BIDS AND PROPOSALS**

Regardless of cause, late bids and proposals will not be accepted and will automatically be disqualified from further consideration. It shall be solely the Contractor's risk to assure delivery at the designated office by the designated time. Late bids and proposals will not be opened and may be returned to the Contractor at the expense of the Contractor or destroyed if requested.

### **1.19. PAYMENT TERM**

All payment terms will be computed from the date of delivery of supplies or services OR receipt of a properly executed invoice, whichever is later. Unless otherwise noted in the solicitation document, the Department is allowed 30 days to pay such invoices. All Contractors may be required to provide banking information at the time of contract execution in order to facilitate state electronic funds transfer payments.

### **1.20. PREPARATION OF BIDS**

Bids must be written in ink and/or typewritten on bid forms furnished herewith. Erasures and alterations must be initialed by the Contractor in ink. Verbal bids will not be accepted. Facsimile bids sent directly to the Department will not be accepted; however, facsimile bids sent to a third party and then delivered to the Department in a properly addressed, sealed envelope will be accepted. Bid quotations shall be considered firm for 30 days after the date of opening unless otherwise stated in writing within the bid package.

### **1.21. RECIPROCAL PREFERENCE**

The State of Montana applies a reciprocal preference against a Contractor submitting a bid from a state or country that grants a residency preference to its resident businesses. A reciprocal preference is only applied to an invitation for bid for supplies or an invitation for bid for nonconstruction services for public works as defined in section 18-2-401(9), MCA and then only if federal funds are not involved.

For a list of states that grant resident preference, see <http://gsd.mt.gov/ProcurementServices/preferences.mcp>

### **1.22. REFERENCE TO CONTRACT**

The contract or purchase order number MUST appear on all invoices, packing lists, packages and correspondence pertaining to the contract.

### **1.23. REGISTRATION WITH THE SECRETARY OF STATE**

Any business intending to transact business in Montana must register with the Secretary of State. Businesses that are incorporated in another state or country, but which are conducting activity in Montana, must determine whether they are transacting business in Montana in accordance with sections 35-1-1026 and 35-8-1001, MCA. Such businesses may want to obtain the guidance of their attorney or accountant to determine whether their activity is considered transacting business.

If businesses determine that they are transacting business in Montana, they must register with the Secretary of State and obtain a certificate of authority to demonstrate that they are in good standing in Montana. To obtain registration materials, call the Office of the Secretary of State at (406) 444-3665 or visit their website at <http://sos.mt.gov/>.

### **1.24. REJECTION OF BIDS**

The Department reserves the right to reject any and all bids (wholly or in part) which fail to meet the terms, conditions and specifications of the bid package; or, are determined to be not in the Department's best interests; or, for which funding is not available. The Department reserves the right to reject bid proposals, waive technicalities or advertise for new proposals. Bids will be firm for 30 days, unless stated otherwise in the text of this invitation for bid.

A written or verbal explanation regarding rejected bids may be obtained by contacting the Purchasing Services Section (406-444-6033) in Helena.

## **1.25. SEPARABILITY CLAUSE**

A declaration by any court, or any other binding legal source, that any provision of the contract is illegal and void shall not affect the legality and enforceability of any other provision of the contract, unless the provisions are mutually dependent.

## **1.26. SHIPPING**

Supplies shall be shipped prepaid, F.O.B. Destination, unless the contract specifies otherwise.

## **1.27. SOLICITATION DOCUMENT EXAMINATION**

Contractors shall promptly notify the Department of any ambiguity, inconsistency or error, which they may discover upon examination of a solicitation document.

## **1.28. TAX EXEMPTION**

The State of Montana is exempt from Federal Excise Taxes (#81-0302402).

## **1.29. TECHNOLOGY ACCESS FOR BLIND OR VISUALLY IMPAIRED**

Contractor acknowledges that no state funds may be expended for the purchase of information technology equipment and software for use by employees, program participants or members of the public unless it provides blind or visually impaired individuals with access, including interactive use of the equipment and services, that is equivalent to that provided to individuals who are not blind or visually impaired. (Mont. Code Ann. § 18-5-603) Contact the State Procurement Section at (406) 444-2575 for more information concerning nonvisual.

## **1.30. TERMINATION OF CONTRACT**

Unless otherwise stated, the Department may, by written notice to the Contractor, terminate the contract in whole or in part at any time the Contractor fails to perform the contract.

## **1.31. UNAVAILABILITY OF FUNDING**

The contracting agency, at its sole discretion, may terminate or reduce the scope of the contract if available funding is reduced for any reason. (Mont. Code Ann. § 18-4-313 (3))

## **1.32. UNIT PRICE**

Unless otherwise specified, the unit price for each line item must be provided in the appropriate space within the bid document. This shall be known as the "base" bid. The unit price for multiple items must be extended to reflect the total price for the quantity of items requested. Unless otherwise specified, the unit price shall prevail.

## **1.33. U.S. FUNDS**

All prices and payments must be in U.S. dollars.

## **1.34. VENUE**

This solicitation is governed by the laws of Montana. The parties agree that any litigation concerning this bid, request for proposal, limited solicitation or subsequent contract, must be brought in the First Judicial District in and for the County of Lewis and Clark, State of Montana and each party shall pay its own costs and attorney fees. (Mont. Code Ann. § 18-1-401)

### **1.35. WARRANTIES**

The Contractor warrants that items offered will conform to the specifications requested, to be fit and sufficient for the purpose manufactured, of good material and workmanship and free from defect. Items offered must be new and unused and of the latest model or manufacture, unless otherwise specified by the State. They shall be equal in quality and performance to those indicated herein. Descriptions used herein are specified solely for the purpose of indicating standards of quality, performance and/or use desired. Exceptions will be rejected.

## **2.0. GENERAL INFORMATION AND REQUIREMENTS**

Provide and deliver F.O.B. Helena, Montana, radio communication equipment per the specifications listed herein. The radio equipment will include GE MDS 9790A Master Station radios, and GE MDS 9710A Remote Station radios as described in the specifications. Each communication system will comprise of a single Master Station and several Remote Stations communicating to the Master.

Radio equipment shall be delivered by the successful vendor on an "as needed" basis at a firm cost per each as established by this solicitation during the contract period from date of signed contract through August 30, 2011.

### **2.1. CONTRACT EXTENSION**

This contract may, upon mutual agreement, be extended in one (1) year increments for a period not to exceed a total of three (3) years, [two (2) additional years]. This extension is contingent upon legislative appropriations and in no case may a contract run longer than three (3) years. Extension of this contract will be possible only by way of duplication of the terms, conditions and prices of the original existing contract.

Any intention to extend the contract must be initiated in writing prior to the termination date of the existing contract or termination date of a contract, which has been previously extended.

### **2.2. CANCELLATION**

This contract may be canceled by the Department for non-performance on the part of the vendor.

Upon receipt of written notice of non-performance from the Department, the vendor shall cure the specified item(s) of non-performance within 24 hours.

Failure on the part of the vendor to cure the specified item(s) of non-performance within 24 hours will be grounds, at the Department's discretion, for immediate termination of the contract.

The final decision as to whether or not the item(s) of non-performance has been cured will be made by the supervisor of the Purchasing Services Section.

### **2.3. PURCHASE FROM ANOTHER SOURCE**

If for any reason whatsoever the vendor refuses or is unable to timely deliver products to the Department during the contract period, the Department reserves the right to purchase product from another source.

## **2.4. DELIVERY**

All costs associated with the transportation of the radio equipment from the point of fabrication to the final destination are to be absorbed in the bid price for each item. There **will not** be a separate bid item for the delivery of the radio equipment.

Ship equipment for this contract to the following location:

F.O.B.: Montana Department of Transportation  
Traffic Engineering  
2701 Prospect Avenue  
Helena MT 59602

## **3.0. COMMODITY SPECIFICATIONS**

Provide and deliver F.O.B. Helena, Montana, radio communication equipment per the specifications listed herein. The radio equipment will include GE MDS 9790A Master Station radios, and GE MDS 9710A Remote Station radios as described in the specifications. Each communication system will comprise a single Master Station and several Remote Stations communicating to the Master.

### **3.1. LICENSED RADIO COMMUNICATION SYSTEM EQUIPMENT SPECIFICATIONS**

- 3.1.1. The manufacturer of all radios supplied under this contract must be certified as an ISO 9001 approved facility. A certificate of ISO 9001 registration must be included with the bid documents.
- 3.1.2. All radio hardware will be capable of both analog (4-wire audio) or digital operation. Changing from analog to digital or back is achieved by software changes only.
- 3.1.3. Data throughput must be 9600 baud within a 12.5 kHz channel. This speed is constant over the air. Radio port speeds are independently configurable from 110 to 38400 baud.
- 3.1.4. The proposed system will provide features that allow the master station radio to access all pertinent data on the operation of the remote radios without interfering with the telemetry data flow.
- 3.1.5. Software tools will be available to allow the Radio System Maintenance and Diagnostic data to be accessed from the Master radio and displayed in graphical form on a standard PC using Windows.
- 3.1.6. Hardware and/or software facilities that allow the Radio System Maintenance and Diagnostic data to be accessed via a web server over a network should be included in the system pricing. This feature of the radio system will allow data to be viewed from anywhere in the Enterprise.
- 3.1.7. User adjustments to radio equipment must be software-settable. Electro-mechanical adjustments are not acceptable.

### **3.2. MASTER STATION RADIO**

- 3.2.1. The radio shall operate in the 800-960 MHz frequency band. Any fixed frequency Tx/Rx split combination can be supported. The radio shall be able to operate in full-duplex, half-duplex or simplex mode.
- 3.2.2. Each master station and its assigned remote units shall operate on a unique transmit/receive frequency pair and on a non-interfering basis with the other master/remote systems.

- 3.2.3. The radio shall have redundant transceivers and power supplies, operating in warm-standby mode. It shall automatically switch-over to the standby equipment upon the detection of an alarm in the on-line system.
- 3.2.4. The master station radio must be mountable in a standard 482.6 mm (19in) rack space. Rack mount hardware must permit flush front mounting for cabinets or center mounting for Telco style racks. The chassis must not exceed 9cm (3.5in) (2U) high x 48cm (19in) wide—including duplexer and power supply.
- 3.2.5. The master station radio must have a modular construction with plug in modules for the transceivers and the Power supply. All plug in modules must be easily accessible.
- 3.2.6. The front panel should provide easy configuration tools. These configuration tools must include a 4 by 20 character display and appropriate data entry switches.
- 3.2.7. The front panel will enunciate system alarms on front panel LED's and the display. The front panel will also be a plug-in module. A fault in the panel must not affect the operation of the master radio.
- 3.2.8. All radios must use N-Type connectors for interface to the antenna and external duplexers. The use of any other connector is unacceptable.
- 3.2.9. The radio shall operate continuously with both transmit and receive functions operating simultaneously (full duplex).
- 3.2.10. The master station shall meet the following Transmitter requirements:
  - 3.2.10.1. Output Power (at the antenna port): 5 watts (+37 dBm) maximum, adjustable from 0.1 watt (+20 dBm) to 37 dBm.
  - 3.2.10.2. Duty Cycle: 100%, continuous at 5 watt RF output over the temperature range of -30oC to +60oC.
  - 3.2.10.3. Data Turn Around Time (Tx-Rx-Tx): 10 ms, including RTS/CTS delay.
  - 3.2.10.4. Transmit Frequency: 800 TO 960 MHz
  - 3.2.10.5. Stability:  $\pm 0.00015\%$  from -30° to +60°C. (For both 12.5 kHz and 25 kHz channels)
  - 3.2.10.6. Modulation Type: Multi-level CPFSK
  - 3.2.10.7. Spurious/Harmonic Emissions (Conducted): 9 kHz to 1 GHz: -73 dBc  
1 GHz to 12.5 GHz: -67 dBc
  - 3.2.10.8. Output Load Impedance: 50 Ohms
  - 3.2.10.9. Modulation Deviation:  $\pm 2.5$  kHz (12.5/25 kHz channels)
  - 3.2.10.10. PTT Delay: 0 - 255 ms, Programmable in 1 ms increments.
- 3.2.11. The master station shall meet the following Receiver Requirements:
  - 3.2.11.1. Type: Dual conversion, superheterodyne
  - 3.2.11.2. Sensitivity/Bit Error Rates (BER): Sensitivity and BER specifications must be measured at the antenna port and include all losses associated with the duplexer. 4 Wire Audio: -115 dBm (0.3 uV) 12 dB SINAD, 300 - 9600 bps  
Digital Interface: -113 dBm for 1 x 10<sup>-6</sup> BER
  - 3.2.11.3. Frequency Stability (for both 12.5 kHz and 25 kHz channels):  $\pm 0.00015\%$  from -30° to +60°C.
  - 3.2.11.4. Receive frequency: 800-960 MHz, Standard
  - 3.2.11.5. RF Input Impedance: 50 Ohms
  - 3.2.11.6. Intermodulation (EIA): -65 dB, minimum

3.2.12. The master station shall meet the following general specifications:

- 3.2.12.1. Input Power: 90-267 VAC with 1hr. battery backup available, 12, 24 and 48 VDC available
- 3.2.12.2. Alarm Contact Outputs: Transmitter A/Receiver A, Transmitter B/Receiver B
- 3.2.12.3. Indicators: 4 LED Alarms for each transceiver as follows: Active Standby, System Fault, Receiver Fault, Transmitter Fault. LCD Display: 4x20 character

3.2.13. The master station shall meet the following voice frequency specifications (for external modems).

- 3.2.13.1. VF Response (reference to 1 kHz): Bell C2
- 3.2.13.2. VF Input: Adjustable levels from -20 to +3 dBm
- 3.2.13.3. VF Output: Adjustable levels from -20 to +7 dBm
- 3.2.13.4. VF Interface: 4-wire, 600 Ohms impedance, balanced

3.2.14. The master station shall meet the following environmental specifications:

- 3.2.14.1. Temperature Range: Full performance -30° to 60°C. Operational performance -40° to +70°C.
- 3.2.14.2. Humidity Range: 0 to 95% relative humidity at 40° C, non-condensing

3.2.15. The radio must be from the MDS 9790A Series of master stations manufactured by GE Digital Energy-Communications/MDS.

### **3.3. REMOTE STATION RADIO**

- 3.3.1. The radio shall operate in the 800-960 MHz frequency band using any fixed frequency Tx/Rx split. The radio shall be able to operate in half-duplex or simplex mode. Each group of remote station radios and their associated master station radio shall operate on unique transmit/receive frequency pairs, on a non-interfering basis with other master/remote systems.
- 3.3.2. The radio must be synthesized and programmable to all frequencies in the applicable frequency bands.
- 3.3.3. The radio shall operate in the half-duplex mode with transmitter keying provided by the associated Remote Terminal Unit.
- 3.3.4. The radio shall have, as an option, an external orderwire adapter module to accept a telephone handset. The orderwire handset will be used for voice communication to the master station for service functions.
- 3.3.5. The radio must provide a "Sleep Mode" capability. This feature enables a command from the RTU to switch the radio between a low power consumption mode and normal operation. When in "Sleep Mode", the current draw must not exceed 16 mA.
- 3.3.6. The radio must operate without outputting false data due to a squelch tail.
- 3.3.7. The radio shall meet the following Transmitter specifications:
  - 3.3.7.1. Output Power (at the antenna port): 0.1 to 5 Watts Programmable
  - 3.3.7.2. Automatic Closed Loop Power Control: Transmit power must be maintained at its preset output (+/- 2 dB) for input. power variations from 10.5 to 16 VDC.

- 3.3.7.3. Data Turn Around Time (Tx-Rx-Tx): 10 msec including RTS/CTS time Delay.
- 3.3.7.4. Duty Cycle: 100%, continuous
- 3.3.7.5. Transmit Frequency Range: 800 TO 960 MHz (Available Bands: 800 TO 880, and 880 to 960 MHz)
- 3.3.7.6. Frequency Stability:  $\pm 0.00015\%$ , 1.5 ppm, -30° to 60°C
- 3.3.7.7. Modulation Type: Multi-level CPFSK Intermodulation 40 dB
- 3.3.7.8. Output Impedance: 50 Ohms
- 3.3.7.9. Time-Out Timer: Programmable from 1 to 255 seconds, or off in 1 second increments; via PC or Hand-held terminal.
- 3.3.7.10. RTS-CTS Delay: Programmable from 0-255 msec in 1 msec increments; via PC or Hand-held terminal.
- 3.3.7.11. PTT Delay: Programmable from 0-255 msec in 1 msec increments, via PC or Hand-held terminal.
- 3.3.7.12. Soft Carrier Dekey: Programmable from 0-255 msec in 1 msec increments

3.3.8. The radio shall meet the following Receiver specifications:

- 3.3.8.1. Type: Dual conversion, superheterodyne
- 3.3.8.2. Frequency Stability:  $\pm 0.00015\%$ , 1.5 ppm, -30° to 60°C
- 3.3.8.3. Sensitivity/Bit Error Rate (at antenna input port): 4 Wire Audio: -115 dBm (0.3 uV) 12 dB SINAD, 9600 bps Digital Interface: -111 dBm for 1 x 10<sup>-6</sup> BER
- 3.3.8.4. Receive Frequency Range: 800 to 960 MHz (Available Bands: 800 to 860, 860 to 900, and 900 to 960 MHz)
- 3.3.8.5. Bandwidth Compatibility: Programmable in 6.25 kHz increments
- 3.3.8.6. RF Input Impedance: 50 Ohms
- 3.3.8.7. Intermodulation (EIA): -75 dB, minimum)
- 3.3.8.8. Received Signal Strength Indicator: Built-in, Range: -120 dBm to -50 dBm

3.3.9. The radio shall meet the following Power and miscellaneous specifications:

- 3.3.9.1. Input Power: Voltage: 13.8 Vdc Nominal, (10.5-16 Vdc Operating Range).
- 3.3.9.2. Current Draw: Transmit, 2.0 amps typical at 5 watts RF output, Receive, 125 mA operational, Sleep Mode, 16 mA
- 3.3.9.3. LED Indicators: Visible: PWR, DCD, TXD, RXD (not used in analog mode), Analog Radios - Keyline Active, Transmitter ON, Squelch Open, Power / Alarm, General Alarm. Digital Radios - Carrier Detect, Transmit Data, Receive Data, Power / Alarm.

3.3.10. The radio shall meet the following Voice Frequency specifications for operation with an external modem:

- 3.3.10.1. Frequency Response: +1, -4 dB, 50 to 3000 Hz
- 3.3.10.2. Analog Input: Adjustable level from -20 to +6 dBm
- 3.3.10.3. Output: Adjustable level from -20 to +6 dBm
- 3.3.10.4. Interface: 4-wire, 600 Ohms impedance, unbalanced
- 3.3.10.5. Transient Protection: 2500 Volt Isolation on VF inputs and outputs; power supply, keying, and alarm circuits (option)
- 3.3.10.6. Data Rate: Radio port speeds are configurable from 110 to 38400 baud.
- 3.3.10.7. Pre-emphasis/De-emphasis: The radio must contain pre-emphasis/de-emphasis circuitry, for compatibility with existing voice frequency radio equipment

3.3.11. The radio shall meet the following physical specifications:

- 3.3.11.1. Mounting: All radio PC boards including RF, modem and diagnostic PC boards must be enclosed in a single cast aluminum housing to eliminate interference with data/computer equipment. A plastic housing or a housing with vents which can allow dust into the radio is not acceptable.
- 3.3.11.2. Temperature Range: Full performance from -30° to 60°C. Operational performance from -40° to +70°C.
- 3.3.11.3. Humidity Range: 0 to 95% relative humidity, at 40° C non-condensing

3.3.12. The remote radio must be fully synthesized. Opening the radio to change, frequency crystals, or DIP switches is unacceptable.

3.3.13. Antenna connectors must be Type N. Lower quality "UHF" type connectors are not acceptable.

3.3.14. The remote radio must have the ability to monitor its internal operation and diagnostic parameters via a hand held terminal or personal computer plugged into the remote radio. The terminal or PC must be able to monitor the following functions:

3.3.14.1. RADIO PARAMETERS

- transmit and receive frequencies
- time-out timer setting
- soft carrier dekey setting
- PTT delay
- CTS delay
- unit address
- software rev level
- serial no./model no.

3.3.14.2. RADIO DIAGNOSTICS

- transmit power
- frequency
- regulator voltage
- power supply voltage
- internal temperature
- received signal strength

3.3.15. Remote transceivers must contain a built-in RTU simulator to enable over-the-air tests of data polling quality. It must be possible to activate the simulator locally using radio configuration software, or remotely using the diagnostic software (see Section 4.0).

3.3.16. Remote transceivers must include a Remote RTU Reset pin on the data interface port. It must be possible to activate this pin locally using radio configuration software, or remotely using the diagnostic software (see Section 4.0). The required output for this pin shall be +10 Vdc or -10 Vdc (selectable). It must be capable of supplying a current of 20 mA.

3.3.17. The radio must be FM/UL approved for Class I , Division 2, Groups A, B, C, D hazardous locations as an option.

3.3.18. The Remote Station Radio shall be an MDS 9710A Transceiver manufactured by GE Digital Energy-Communications/MDS, or equal. The remote station shall be fully compatible with an MDS 9790A master station, or equal unit that provides for front panel configuration and diagnostics via an LCD screen.

### 3.4. RADIO SYSTEM DIAGNOSTICS

- 3.4.1. The radio shall include system diagnostic capability to permit automatic monitoring of key operating parameters and alarm conditions. In addition, critical radio status and alarm conditions must be enunciated on LED indicators on the front panel of the radio.
- 3.4.2. Diagnostic software must operate under MS Windows 98/NT/XP to enable an IBM compatible personal computer (PC) to communicate with the radio diagnostics controller via a separate RS-232 diagnostic port on the master station radio. The PC with software will serve as a central diagnostic reporting tool for the entire point-to-multipoint radio system.
- 3.4.3. The diagnostic package must support communications of diagnostic data from all remote radios in the system to the master station radio over the radio's RF channel. If a repeater radio is utilized, diagnostics from all remote radios and from the repeater must be sent over the RF channel to the polling remote radio. It will not be acceptable to require a separate external communications link between the PC and the repeater radio to obtain diagnostic data at the polling remote site.
- 3.4.4. Diagnostic software must be able to accommodate any combination of communications links to remotely located master or repeater stations. Software must automatically connect to all master stations in the radio system via dedicated modem, dial up modem, or hard wired RS-232 link. Each master station, repeater station, and polling remote must have a unique diagnostic address.
- 3.4.5. All status and alarm information obtained from the radio system must be displayed on CRT screens, and if required, printed or archived to data base files for future recall and analysis. As a minimum, diagnostic software must have the following features:
  - 3.4.5.1. A Windows 98/NT/XP™ based Graphical User Interface (GUI)
  - 3.4.5.2. Ability to poll 256 Master Stations, each with up to 512 Remote Radios
  - 3.4.5.3. Single screen view of the status of all radios in the system
  - 3.4.5.4. Universal tab-delimited Equipment Lists and Diagnostic Report files to permit access by spreadsheet and graphing programs.
  - 3.4.5.5. The ability to make all of the retrieved diagnostic data available to other SCADA software packages or computers on the same network via Dynamic Data Exchange (DDE) and/or Open Data Base Connectivity (ODBC) using Structured Query Language (SQL) Diagnostics to all radios must be performed without disruption to the payload or user data A radio link quality indication for diagnostic messages or for a combination of payload and diagnostic messages.
  - 3.4.5.6. User settable alert/alarm conditions for all measured values
  - 3.4.5.7. The ability to send an automatic e-mail message via SMTP when an alarmed radio is detected
  - 3.4.5.8. Software versions optimized for 640 x 480 displays and for 1024 x 768 displays context sensitive help screen Multi-level password protection to prevent unauthorized changes to radio parameters, diagnostic application setup, and radio system configuration
- 3.4.6. Master/Repeater Station Warm Switch-over Diagnostics must provide the following diagnostic and control functions:
  - 3.4.6.1. Monitor and display the operation and status of redundant transmitters, receivers and power supplies and automatically switch over to standby radio upon failure. All modules must be continuously monitored while on line and in standby states.

- 3.4.6.2. Remotely switch to the alternate transmitter or receiver to permit remote trouble shooting of radio hardware and software.
- 3.4.6.3. Remotely test the Warm standby switch-over logic and alarm reporting logic.
- 3.4.6.4. Monitor and display power supply voltage, current and transmit power of redundant power supplies and transmitters.
- 3.4.6.5. Monitor and display received signal strength, frequency offset and FM deviation levels of redundant master station receivers.
- 3.4.6.6. Radio Diagnostics must include control capability to permit remote adjustment of key parameters in the remote radio from a PC connected to the master radio or Polling Remote Radio. The control parameters must include as a minimum:
  - Transmit Power
  - Transmit Frequency Offset
  - CTS Delay
  - PTT Delay
  - Time-Out-Timer Setting
- 3.4.7. Radio Diagnostics retrieved from the Remote Radios must display the following data:
  - 3.4.7.1. The following parameters indicated by a "\*" must be remotely adjustable from the master station. All diagnostic values must be displayed in engineering units (volts, watts, dB, etc.).
    - \*Transmit Power Output
    - Receive Signal Strength
    - Power Supply Voltage
    - Internal Voltage Regulator Voltage
    - Internal Radio Temperature
  - 3.4.7.2. Received Signal Strength must display over the range from -120 dBm to -60 dBm.
  - 3.4.7.3. System diagnostics shall be performed by connecting a PC to the radio. Opening the radio, changing modules, changing DIP switches or requiring an external diagnostic interface unit is unacceptable.
- 3.4.8. The radio system shall offer a network interface solution that enables all radio diagnostics to be available from a LAN or WAN or accessible via the Internet.
- 3.4.9. The radio diagnostic software shall be InSite™ Radio System Management Software supplied by GE Digital Energy-Communications/MDS.

### **3.5. WARRANTY / SOFTWARE / UPGRADES**

Warranty: The contractor warrants all equipment and parts for a period of three (3) years against defects in design, material, workmanship, and operations. The warranty period shall start with the installation date, but not later than ninety (90) days from receipt of the equipment. This warranty covers cost of labor for repair or replacement of defective parts. The contractor is responsible for costs of shipping and handling during the warranty period.

The contractor will provide all software and firmware upgrades during the warranty period, at no cost to the agency.

## 4.0. QUOTE SECTION

Provide and deliver F.O.B. Helena, Montana, radio communication equipment per the specifications listed herein. The radio equipment will include GE MDS 9790A Master Station radios, and GE MDS 9710A Remote Station radios as described in the specifications. Each communication system will comprise a single Master Station and several Remote Stations communicating to the Master. Any future orders will be on an "as needed" basis based on cost per each.

- MDS 9790 Master Station Radio:

Cost per each: \$ \_\_\_\_\_

Extension for (1) each: \$\_\_\_\_\_

- MDS 9710 Local Transceiver:

Cost per each: \$\_\_\_\_\_

Extension for (20) each: \$ \_\_\_\_\_

## 5.0. DELIVERY

Delivery will be requested: 30 Days after receiving order (ARO).

## 6.0. AWARD PROCESS

Award will be on an all-or-none basis based on total cost.

The Department also reserves the right to cancel this contract if cancellation is deemed to be in the Department's best interest.

**CONDITIONS OF BID DISQUALIFICATION:**

- A) Failure on the part of the vendor to display Invitation for Bid #HWY-309738-JA on the outside of the envelope containing a sealed bid will result in bid disqualification.

[illegible]

HAVE YOU REMEMBERED TO:

- \* Check our website for the latest addendum to the IFB
- \* Sign and return each addendum as required
- \* Review Standard Terms and Conditions
- \* Properly identify return envelope
- \* Sign your bid on the front page
- \* Initial any bid changes you made
- \* Review and complete all requirements listed herein to ensure compliance



MDT attempts to provide accommodations for any known disability that may interfere with a person participating in any service, program or activity of the Department. Alternative accessible formats of this information will be provided upon request. For further information call Jason Armstrong at (406) 444-6033 Voice or 1-800-335-7592 TTY or TTY (406) 444-7696.